

April 17, 1989

Dear Sandians:

I am glad to be back with you. It is a great feeling to return to the Laboratories where I spent most of my professional career. I trust that the experiences of my recent past will prove useful to Sandia. In a sense I was never away, since I remained under the AT&T flag. Nonetheless, Sandia has not stood still these past five years, and I have much catching up to do. I have already renewed many friendships and acquaintances in Albuquerque, Livermore, and elsewhere. In coming months I plan to establish active contacts with all Sandia locations. I look forward to meeting each of you as time goes by.

Sandia is an exceptional institution. The Labs has served our country well during nearly 40 years under AT&T influence and direction. Although much has been accomplished it is essential that we focus continued effort on enhanced nuclear deterrence, environmentally acceptable sources of energy, and other important national-security issues. But we must recognize that the conditions under which we operate as a DOE multi-program national laboratory have become more difficult. At a time when Government spending for R&D is under intense scrutiny, we are faced with growing public demands for perfection in the performance of Government-sponsored work; heightened public concerns over environmental, health, and safety issues; and widespread concerns over the health of U.S. industry. Given these challenges, I think you will agree that it is imperative that our future actions contribute to the strengthening of public confidence in DOE.

I will enumerate specific actions on future occasions. But let me touch briefly on a few of my basic concerns today. **Weapon Stockpile:** The reliability, safety, and security of nuclear weapons in the stockpile or intended for stockpile delivery is our number one responsibility. It takes little reflection to realize how truly awesome this responsibility is. If we fail in our prime mission, there is effectively no one to back us up. **Performance:** We must move toward the ideal of "doing the right thing the first time"; good execution is essential in our tightening economy and can only be achieved by continuous process-quality improvement in everything we do.



Technical Vitality: Creativity and innovation are keys to Sandia's continuing success; technology is advancing at an incredible pace, and we must remain at its forefront. **The Human Dimension:** I am in favor of pushing responsibility and accountability for decisions to the lowest possible level. Higher levels of management should provide the necessary leadership and support to enable lower levels to meet their commitments, not get in their way. We must constantly seek ways to communicate and motivate better if we are to realize the full benefit of this approach. Equality and career planning for all employees also need our constant attention.

Finally, I believe we must build better bridges to our parent company AT&T for the mutual benefit of both sides. In the past our bridges have been mostly one way, with the benefits of the relationship flowing largely to Sandia. Under the current Sandia contract opportunities are provided for flow in the other direction, as well. As members of the AT&T family we should take advantage of such opportunities.

We have much work to do. It will require effort, execution, economy, innovation. I will dedicate the necessary time to this endeavor. I know that you will do the same.

An Around-the-Globe Project

Sandia Applies Efforts to INF Treaty Verification

Applying its expertise in weapon-treaty verification techniques, Sandia has long played a significant part in the complex technical-diplomatic interactions required by modern arms-control agreements. Most recently, the work of Sandians helped US negotiators shape the INF treaty.

The INF is the Intermediate-range Nuclear Force Treaty in which the US and the USSR agreed to ban the production and eliminate existing inventories of nuclear ground-launched ballistic and cruise missiles

with a range of 300 to 3400 miles.

Other major provisions of the treaty provide for a number of different types of on-site inspections for verifying treaty compliance.

"The process of negotiating effective arms control agreements is extremely complex and slow," says

Roger Hagengruber, Vice-President of Exploratory Systems 9000. "Interagency negotiations within the US government to formulate our national positions are often as difficult as those with the Soviets.

"Among the challenges are to reconcile tech-
(Continued on Page Six)

'A Total Labs Accomplishment'

"I cannot emphasize enough how much our INF work is a total Labs accomplishment," says Roger Hagengruber (9000). "While Organization 9240 has had the lead role in representing Sandia, other organizations throughout the Laboratories were critical to the success we had.

"Purchasing and Plant Engineering [now Facilities] made it happen with an exceptional effort to recognize and react to priorities. All the direct support groups that were called upon to help quickly became part of the team. The efforts of the USAF Electronic Systems Division, which funded the program, and EG&G and other contractors that contributed were all important to the program.

"There are so many that deserved credit; but I especially want to single out Ron Moya and his division, and the Organization 5200 management, who took on the TOSI job and executed exceptionally well in every respect."



COULD SUCH a boxcar be carrying part of a missile banned by the INF treaty? Stan Fraley (9242, center) is Sandia's program leader for technical on-site inspection (TOSI) efforts. With Stan are Lt. Col. John Sovich of the USAF Electronic Systems Division and Terry Herther (9115). Terry is Sandia's project engineer for the "Cargoscan"™ effort. This full-scale prototype of the Cargoscan™ system (at Sandia's TOSI facility) will be replicated at the Votkinsk inspection site for x-ray inspection of boxcar contents.

Saturn Record
— See Page Five



LAB NEWS

VOL. 41, NO. 8 SANDIA NATIONAL LABORATORIES APRIL 21, 1989

This & That

Nice to Be Noticed -- Ray Harrigan, supervisor of Intelligent Machine Systems Div. 1414, heard some nice words about Sandia's robotics R&D last month. The keynote speaker at the American Nuclear Society's International Symposium on Robotics and Remote Systems commented during his speech: "You need to pay attention to what is going on at Sandia. That is the way to do robotics."

The speaker was Joseph Engelberger, founder of Unimation Corp. and builder of the first PUMA robots -- large, programmable manipulators used in industry and research programs. Engelberger has been called the "father of robotics."

* * *

Lots of Years -- Did you notice the retiree photos last issue? Howard Austin retired after 43 years of service, and Lyle Hake after 40. Bill Thomas, who retired last year, has the record at 43.3.

Sandia observes its 40th anniversary later this year, so you might ask how they all accumulated more than 40. Along with quite a few others still here, they first worked for (what's now) Los Alamos National Lab. Sandia began operations as a branch of LANL, and quite a few folks transferred when Sandia became a separate entity. So they get service credit for their LANL years.

Sandia has 22 employees still on roll who have more than 40 years of service and about 230 with more than 35. G. C. Hollowwa (3411) is tops, followed closely by John "Jack" Suttman (9122); both have more than 42 years.

Thanks for the info: Mark Calvin and Rick Andes (both 3532).

* * *

Tax-Free College Money -- Interest on US Savings bonds (EE series) bought after 1989 will be tax-free, not just tax-deferred, for many persons who will use the principal and interest to pay for college expenses. You'll have a chance to sign up for payroll deductions for these bonds during the bond drive that begins next week. The new tax-free program and other bond options are explained in this issue.

* * *

Yes, They Have Hearts -- Some of us may wonder, especially during lean years, if Sandia's budget specialists have hearts.

But Gary Sanders (7232) knows they do. During an April 2 bike ride with a friend on Highway 66 through Tijeras Canyon, Gary took a nasty spill, bloodying himself badly. A stranger pulled up in a jeep, offering to take Gary and friend to the hospital and haul their bikes along. "He wasn't concerned with the stains that my bloody knee, hip, hands, elbow, shoulder, and head might leave in his vehicle," says Gary.

The "Good Samaritan" was Roger Thorp, supervisor of Energy and External Budget Div. 143, which Gary discovered only the next day after thinking that Roger's name sounded familiar and checking for his name in the Sandia directory.

* * *

Sandia Secretaries -- Next week is National Secretaries Week. Several related stories are in this issue -- about the tough requirements Sandia secretaries must meet to get hired and how secretaries are recruited. Only one out of seven applicants passes the battery of tests and gets hired. You probably already respect their abilities, but you may gain even more by taking a few minutes to read the stories. ●LP

Supervisory Appointment



BRENDA DeLAURENTIS to supervisor of Payment Processing Section 154-1, effective Jan. 1.

Brenda joined Sandia in January 1983 as a systems analyst in the Financial Policies and Procedures Division. She later was a budget analyst in the Defense Budget Division and DOE liaison in the Energy and External Liaison Budget Division.

She has a BA in accounting from West Virginia University and an MBA in finance from Ohio State University. Before joining the Labs, she worked for an accounting firm and an insurance company in Columbus, Ohio.

Brenda's spare-time activities include jogging, biking, and volunteer work. She and her husband John (1421) live in the NE Heights.

Sympathy

To Timothy Moss (7243) on the death of his grandmother in Janesville, Wis., March 6.

LAB NEWS

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BOB CLEM (9100, right) has received the Air Force's Exceptional Civilian Service medal. Here, he and Roger Hagengruber (9000) display Bob's citation -- for distinguished performance as a member of the Air Force's Scientific Advisory Board from 1984 to 1988. He chaired the Armament Division Advisory Group and a Board Meeting on Smart Weapons, as well as serving on several panels and committees.

Transmission Electron Microscopy Will Fine-Tune Embedded-Atom Calculations

New techniques in microscopy are providing Sandia researchers with greatly improved tools to study the atomic structure of materials. The recent acquisition of a high-resolution transmission electron microscope by Departments 8340 and 8310 opens up new capabilities in materials research. This is the first such instrument at any Sandia location.

"We're interested in looking at the structure of materials at the atomic level and comparing our results to theoretical calculations based on the Embedded Atom Method [EAM]," explains George Thomas (8341). "We can now focus on the internal structure of metals with an impressive resolution of 0.17 nanometre — remember that 25 million nanometres equals one inch!

"This tool enables us to pinpoint regions that previously we could only simulate on large computers, George says. "In theory, our experiments can now be in the same size-range as the computer sim-

Embedded-Atom Method Treats Complex Phenomena

The embedded-atom method (EAM), developed by researchers at Sandia Livermore, is a relatively new theory of metals that permits detailed atomistic studies of phenomena — such as hydrogen-assisted fracture in nickel — too complex for previous methods.

The EAM has been used extensively in describing the effect of hydrogen on metals. Realistic atomic-scale calculations of hydrogen-assisted fracture have been performed to show the effects of hydrogen on metal bonding, as well.

The EAM has also been applied to other studies, including the structure of intermetallic alloys; the reflection of low-energy hydrogen scattered from surfaces; and dynamic fracture studies, including dislocation motion.

ulations." George, along with Mike Mills (8314), is the principal researcher using the new device.

The 400-kilovolt (kV) microscope stands 10-1/2 feet tall and fills most of the specially constructed, 14-ft. by 20-ft. lab it occupies in Building 916. Requirements for temperature control, floor stability, and sound insulation are stringent.

Shhh — Microscope Working!

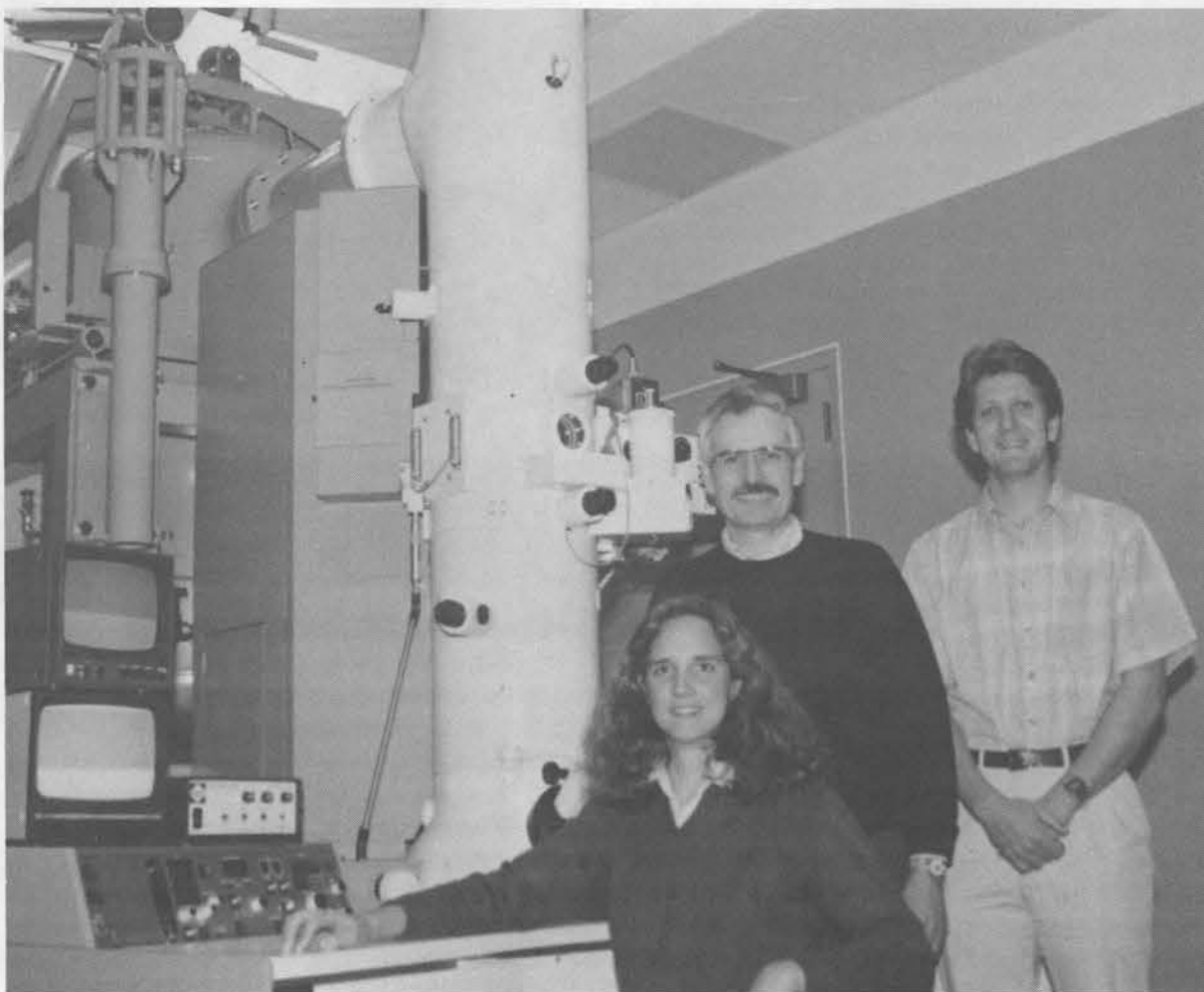
"Even movements as small as the atomic spacing in crystals will affect image quality," George explains. "Therefore, it's critical that we experience no vibration and keep the temperature very stable. For example, when we're working at high magnification, just talking in a normal voice will actually modulate the image. That's the reason for the sound-absorbing panels on the walls."

A major area of research with the new instrument will be trying to understand how crystalline defects in metals influence mechanical properties and the metals' susceptibility to failure under adverse environments.

One of the first studies will be the structure of grain boundaries in pure metals — how the individual crystallites of a metal fit together to form a solid. Observations will be correlated with EAM calculations and used to fine-tune functions used in the calculations.

The microscope can be directly operated at a magnification of up to two million times. In addition, the images are recorded on film, which are in turn photographically enlarged, so the final image magnification can exceed 20 million. But the maximum size of a sample is a mere three millimetres in diameter (approximately one-eighth inch), and only a very small portion of it can be studied at one time.

The sample has to be thin. "Even with the beam penetration possible at 400 kV, high-resolution microscopy is good only for very thin materials," says



NEW HIGH-RESOLUTION transmission electron microscope has been installed in its Bldg. 916 lab. Shown with the new instrument are (from left) Glenda Gentry, George Thomas (both 8341), and Mike Mills (8314).

George. "To study bulk materials, we first prepare samples in the form of super-thin slices, typically using electrochemical methods."

The only other high-resolution instrument available in the Livermore area is at Lawrence Berkeley Lab's National Center for Electron Microscopy. LBL has a one-million-volt device that outside researchers can use. However, it's available only a few days at a time.

Sandia's new microscope already benefits the study of weapons and energy-related materials. George foresees additional applications in conjunction with programs at Albuquerque, such as high-temperature superconductors. He and Mike are also interested in joint projects with other national labs and universities — projects that could take advantage of the new high-powered capabilities at SNLL.

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SANDIA LIVERMORE NEWS

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SANDIA NATIONAL LABORATORIES

APRIL 21, 1989



"WELCOME TO LIVERMORE," says VP John Crawford (left, 8000) as he greets new Sandia President Al Narath on his first official visit April 6. Al toured some new Livermore facilities and was briefed by the five SNLL directors. He also met LLNL Director John Nuckolls.

Secretaries Help Recruit Secretaries

Robin Cassell (5260) met recently with 130 Highland High School students to talk about her job as a Sandia secretary. "I tried to impress upon them the idea that the secretarial profession is one of the few remaining professions that, with careful planning, they can prepare for while still in high school," says Robin.

"They can get the typing skills they'll need and, sometimes, the shorthand skills, though some schools have stopped teaching shorthand. They can also select classes that will sharpen their abilities in grammar, punctuation, vocabulary, and spelling — the basic skills needed for entry-level secretaries."

Robin chairs Sandia's Secretarial Committee, which works with employment coordinator Soila Brewer (3533) to interest high school students in the secretarial field.

"Members of the committee have visited eight Albuquerque high schools — some several times — as well as schools in Belen, Los Lunas, and Moriarty, making about 40 presentations to more than 2300 students," notes Soila.

Recruiting Is Continual

Recruiting secretaries is a continual activity at Sandia, according to secretarial supervisor Carol Kaemper (21-1): "We're always on the lookout for first-rate secretaries. We try to hire about 50 a year

"We're always on the lookout for first-rate secretaries . . ."

just to take care of normal attrition."

(Carol supervises secretaries in Organizations 5000, 6000, 7000; Shirley Dean, 22-2, supervises those in 100, 1000, 2000, 3000, and 9000.)

It isn't that secretarial turnover rates are high at Sandia. They're actually quite low. "But," explains Shirley, "we have about 475 secretaries on roll. Each year, some retire or take leave of absence, but many more are promoted to higher-level secretarial positions or transfer into non-secretarial positions, leaving about 50 vacancies that must be filled.

"We're finding that we must interview and test about 350 applicants to fill those 50 vacancies. On the average, out of every seven applicants, only one successfully completes all the qualifying tests."

Weak Language Skills a Stumbling Block

The first round of qualifying tests — the typing test — knocks out about a third of secretarial applicants. But the next round, a battery of tests that assess the candidates' comprehension of the basic

"... we must interview and test about 350 applicants to get ... 50 [new hires]."

principles of spelling, grammar, and punctuation, does the big damage.



SECRETARIAL COMMITTEE members made about 40 presentations to more than 2300 high school students in and around Albuquerque to interest them in the secretarial field. Chairing this year's committee is Robin Cassell (5260, right). Members are (from left) Ruth Varga (3150), Marlene Smith (7260), Nancy Glenn (2130), Susie Maldonado (9120), Cheryl Duran (1100), and Gladys Shaw (6420). Not pictured: Renee Zittel (150).

"Today we're finding candidates' skills in these areas weaker than we've seen in all our years of testing," notes Carol. "On the language skills tests, we're losing about half of the applicants who passed the typing test."

Are Sandia's tests for competency in these areas extraordinarily difficult? "No," says Carol. "The tests are carefully designed to measure language skills that are essential to acceptable job performance — we have high standards to ensure that our secretaries are first-rate."

The problem of weak language skills is particularly acute in young applicants — recent high-school graduates who are entering the work force — notes Carol. Older, more experienced applicants fare better.

"We hire candidates of all ages," says Soila. "Some of our applicants are the parents of high-

ing and language skills tests don't pass the shorthand test," says Soila.

Part of the problem, she says, is that business education courses are classified as elective courses, and students are limited in the number of electives they can take. Many are finding it difficult to take a shorthand course. In addition, many high schools no longer offer shorthand at all.

"This is one of the subjects we talk about when we visit the schools," says Robin. "We encourage students to seek out courses they can't get at their own schools, at places like Albuquerque's Technical-Vocational Institute."

How have the schools responded to visits by members of the Secretarial Committee? "The response is very positive," says Robin. "After our first visit to Highland, we were invited to make a second and third visit. Teachers tell us their students are more enthusiastic about their course work after our visits. We even had one shorthand teacher tell us that when she retires from teaching next year, she plans to apply for a secretarial position here." ●DR

Sandia Seeks Secretaries

Sandia continues to conduct a vigorous search for first-rate secretaries. Employees' family members and friends who are looking for secretarial positions are invited to apply by calling 844-3441.

school students whose school the Secretarial Committee visited. Students frequently approach visiting Committee members to ask if a parent can apply. And they certainly can, if they have a high school diploma, though many of our applicants even have bachelor's and master's degrees."

Shorthand Test Takes Toll

The final round of testing — shorthand — also takes a heavy toll.

"More than half of those who survive the typ-



SECRETARIAL SUPERVISORS Carol Kaemper (21-1, left) and Shirley Dean (22-2, right) plot recruiting strategies with employment coordinator Soila Brewer (3533).

How're Your Basic Skills?

About half of Sandia's secretarial applicants fail to pass basic language skills test. While the following test is not modeled on the tests taken by secretarial candidates, it includes 27 common spelling, punctuation, grammar, and vocabulary errors that most Sandia secretaries would probably detect. How many can you spot? See Page Ten for answers and scoring.

Taking a test that purports to test your skills in grammar, spelling, and punctuation can be exhilarating or embarrassing depending on the outcome and the circumstances. If, as in this case, your simply taking an unofficial test for a momentary diversion a high score might give you a brief lift, a low score a moment of private embarrassment. In either case its not likely to have any real affect on your life — you'll neither be benefitted or penalized by your performance. The storey would be alot different however, if this was an official test and you were hoping to be hired into a secraterial position on the basis of your score. You'd probably suffer some tense moments until you were appraised of your score and a low score would certainly effect your life.

Saturn Produces World-Record X-Ray Yield

Record-breaking x-ray yields first reached last fall with Sandia's Saturn accelerator have given researchers a new capability for the nuclear weapon program.

With imploding plasmas as the x-ray source, Saturn has several times produced more than 500 kilojoules of x-ray energy in a single burst lasting 40 billionths of a second. No laboratory x-ray yields approaching that much energy in so short a pulse have been reported elsewhere.

The original goal was more modest, says Rick Spielman of X-Ray Laser Physics Div. 1273: "We felt that 400 kilojoules was achievable, based on the amount of energy Saturn stores. But Saturn is so efficient in delivering its energy that the yield has been better than we expected."

A modification made to Saturn last year lets researchers turn a gas into a plasma and, by magnetic compression, heat the plasma to about 10 million degrees Celsius. That temperature is comparable to the interior of the Sun — about 14 million degrees Celsius.

The hot plasma emits "soft" x rays, which consist of photons — individual "packets" of radiation — carrying energy of less than five kiloelectron-volts (keV) each. Most of the photons in Saturn's record-setting shots have been less than one keV, an extremely soft spectrum.

A chest x ray, by contrast, uses radiation at about 80 keV. X rays as soft as those produced by imploding plasmas simulate the effects of the x rays released by a nuclear explosion.

Air Stops Soft X Rays

Saturn was already a powerful source of "hard" x rays (high-energy photons), used to test the susceptibility of electronic systems to "upsets" caused by x-ray photons penetrating semiconductors.

Reconfiguring Saturn to produce soft x rays instead of hard — or vice versa — is a two-to-three-day job.

The soft x rays produced by Saturn can better reveal how vulnerable military hardware in space is to the soft radiation component of nuclear weapons. Soft x rays are not a military threat in the atmosphere, because they are rapidly attenuated by air or by thin shielding.

Saturn's soft x rays are also being used to investigate the physics of x-ray lasers.

"Saturn gives the United States a higher plane of testing capability," says Jim Powell, manager of Simulation Technology Dept. 1230. "We already had soft x-ray sources within the Department of Defense, but not at the intensity Saturn can produce."

"Now we can do more in aboveground tests,



FAST GAS VALVE and supersonic injection nozzle that Rick Spielman (1273) is holding are part of the gas-puff system used to produce soft x rays on Sandia's Saturn accelerator. Rick is standing underneath the center of Saturn. The large, light-colored ring is the vacuum manifold through which Saturn's center is evacuated before each shot.

and that helps us conduct better underground testing."

The technical approach for coupling Saturn's multi-level electrical output into a single anode and cathode is based on work done at Sandia about 1980, according to Keith Matzen, supervisor of Div. 1273. "Rick took an existing power-flow concept and extended it to the higher voltage and current regime on Saturn," says Keith. "He deserves credit for making it happen."

The experiments producing the record yields were done by Rick, Keith, Warren Hsing, John Porter (all 1273), David Hanson (1264), and Bruce Hammel (formerly of 1273 and now at Lawrence Livermore National Lab). Sam Lopez, Larry Ruggles, and John McGurn (all 1273), together with the Saturn operations crew, provided technical assistance.

How to Implode a Plasma

Now that the new source is operational, Saturn can produce x rays in either of two ways. It was designed primarily for the "bremsstrahlung" mode, in which high-voltage electrons strike an electron-

to-photon converter made of a high-atomic-number metal such as tantalum.

The electrons decelerate, losing energy in the form of hard x-ray photons in the range of several hundred keV to two million electron-volts (MeV).

Saturn's alternate configuration — made possible, says Jim, by an unusually flexible design — is the "gas-puff z-pinch" mode. A high-velocity cylindrical annulus of gas several centimeters long — a puff of gas such as neon or xenon — is injected into the center of the machine.

A current of some 10 million amps is then passed through the gas. The large current, flowing along the axis (the z-direction) of the gas puff, causes a strong magnetic pressure. The pressure rapidly drives the gas inward, toward the axis of the cylinder, creating a high-temperature plasma that radiates x rays.

Creating such a successful imploding-plasma source isn't simple, says Jim: "The guys were working on a complex physics problem to optimize the source. And they paid attention to the engineering aspects of it as well. The combination was a big reason for their success."

State of the Profession

BLS Projects 13% Increase In Secretarial Jobs by the Year 2000

Secretaries held more than 3.2 million jobs in 1986, making this field one of the largest US occupations. The Bureau of Labor Statistics (BLS) projects a 13-percent increase to more than 3.6 million by the year 2000.

While this is a somewhat slower rate of growth than the 19 percent expected in all occupations during the period, it does not mean that secretarial jobs offer poor prospects. On the contrary, says BLS, despite the slower-than-average growth expected, "an exceptionally large number of secretarial job openings will arise through the year 2000," primarily because of the large number of experienced secretaries who transfer to other jobs or stop working (*Occupational Outlook Handbook*, 1988-89 Edition, US Depart-

ment of Labor). Every year, several hundred thousand transfer to other occupations or leave the labor force.

Demand Great for the First-Rate

The handbook stops just short of predicting a national shortage of secretaries during the next 10 years. But, in its description of secretarial opportunities, it uses the term "abundant opportunities," meaning that demand for secretaries will probably greatly exceed supply.

Noting that "many employers complain of a shortage of first-rate secretaries," the handbook predicts that "well-qualified secretaries will be in great demand and should find many job opportunities."

A September 1988 survey conducted by *The Secretary* (official publication of Professional Secretaries International) found that secretarial turnover "has become rampant." Noting that within a two-year period almost half of the nation's secretaries "will leave their jobs," the publication says that 27 percent of employers are "experiencing attraction/retention difficulties" and that this trend is likely to increase in the future.

Contributing to the turnover, the survey found, are the other opportunities and broader career choices now available to women. Women who once would have entered the secretarial field are choosing other occupations.

(Continued from Page One)

Verification

nical people to the politics, and political people to technology. Sandia was able to play a role in adapting technology rapidly to the realities of the political arena, and in teaching and communicating technology to those charged with making political judgments.

"Therefore, our Sandians reflected our traditional commitment to systems engineering and were

"Among the challenges are to reconcile technical people to the politics, and political people to technology."

especially effective in the negotiations because of that."

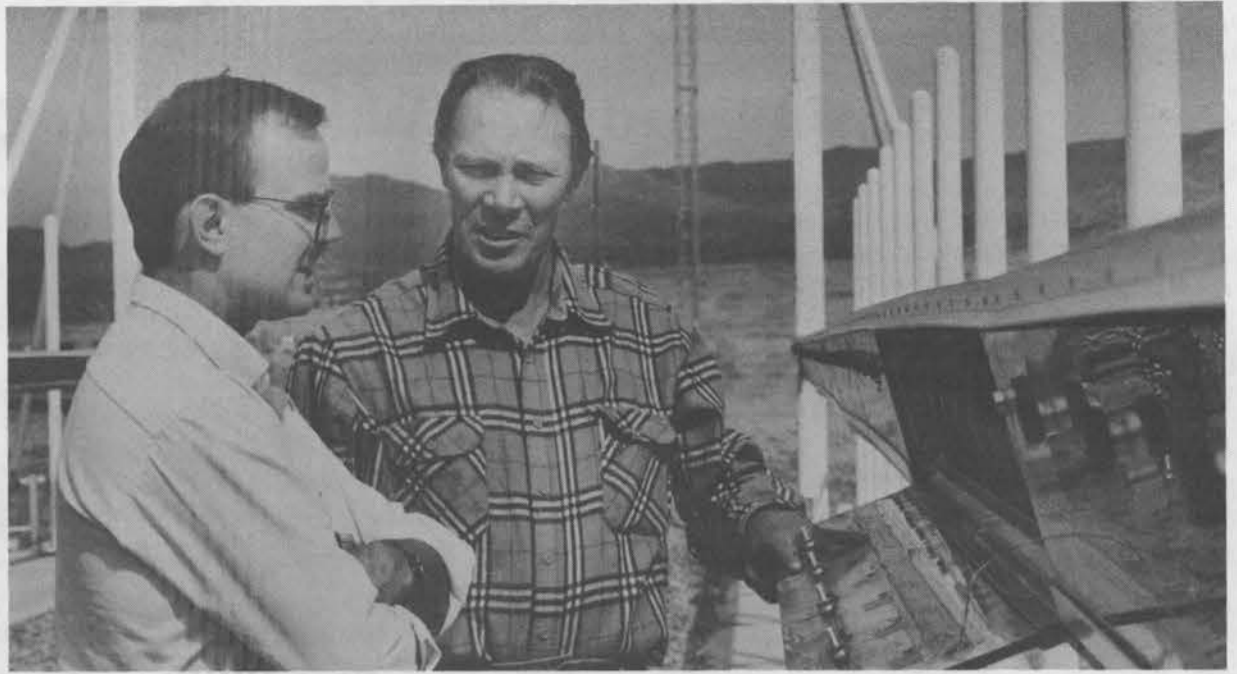
On the technological side, Sandia research and development efforts during INF Treaty negotiations helped define the US position that the treaty should allow continuous monitoring. Those efforts, and their continuation after the signing of the treaty, led to design and production of US inspection devices installed to monitor a Soviet missile plant at Votkinsk.

"That was the engineering portion of the job," says Stan Fraley, supervisor of Verification Systems and Technology Div. 9242 and program leader for the Technical On-Site Inspection (TOSI) work at Sandia. In this matrix-organized project, Stan explains, most of the job of designing and building the hardware fell to Ron Moya's Verification Technology Div. 5219.

"At the same time," Stan continues, "Sandia was helping the verification community develop concepts for a total verification package for the INF treaty."

Sandian Drafts Protocol

Key dates associated with the treaty, compared with the timing of Sandia activities, suggest how Sandia's efforts have fit in. The INF treaty was signed by Ronald Reagan and Mikhail Gorbachev on Dec. 8,



DAVE GANGEL and Dick Sons discuss an infrared profiler developed at Sandia by Bob Graham and Dick (all 5219). The profiler makes it possible for a computer to generate a silhouette of a railcar and determine whether part of a banned missile could fit inside. If so, inspectors can check further. Other infrared profilers scan trucks. Profilers such as these are part of the on-site inspection hardware that went from Sandia to Votkinsk.

1987. It went into force June 1, 1988.

Sandia's TOSI facility (located near Wyoming Blvd. south of Tech Area I) was completed December 15, 1986 — after an accelerated three-month development program undertaken at the request of the Department of Defense. This fast-track development allowed the TOSI facility to be used for developing and testing concepts for verifying the treaty while it was still being negotiated in 1987.

During 1986-87, Stan was the liaison between Sandia and the DoD's Office of Verification Policy. In late summer '86, he was asked to draft an INF Inspection Protocol.

"The reason a Sandian was given the job," explains Stan, "is that the portal-and-perimeter monitoring scheme was a major element, and Sandia was developing that. But this protocol also included all the other types of inspections, such as short-notice inspections and verification of the process of eliminating existing weapons."

("Portal-and-perimeter" refers to a system for monitoring the portals — entry and exit points —

and perimeter — fences or walls — of a missile-producing plant.)

In 1987, Stan went to Geneva as a member of the US delegation to the INF talks (see "Fraley Faces Soviets in Joint Working Group").

No SS-20s Allowed

The INF treaty permits much more "intrusive" means of verification than earlier US-USSR arms-control agreements. "Intrusive" here means that each country installs, operates, and maintains on-site systems to verify that the other country is abiding by the ban on INF weapons.

The USSR is installing verification devices in Magna, Utah, the site of the Hercules plant that manufactures rocket motors used in the treaty-banned Pershing II missile. At the same time, the US is installing in Votkinsk a collection of verification devices shipped out of Sandia's TOSI facility. The Votkinsk plant, in the Ural Mountains about 650 miles east of Moscow, once assembled the intermediate-range SS-20 missile.

"Votkinsk now produces the first stage of the long-range SS-25 missile [not a banned weapon], which uses a first-stage motor that resembles the first stage of the SS-20," says Paul Stokes, manager of Monitoring Technology Dept. 9240. "The similarity means that our TOSI equipment and system operators play a critical role in verifying compliance with the provisions of the treaty."

Preparing for Votkinsk

Since late 1986, the TOSI site has from time to time been the temporary home of hardware brought together by Dept. 9240 (parts of which were previously System Research Dept. 9110) and Safeguards Application Dept. 5210. This collection of sensors, cameras, and traffic-control devices is all linked with Sandia-developed software to create a practical system for monitoring the Votkinsk plant.

The complete system includes scales to weigh and record loaded trucks and rail cars using the por-

"We engage . . . in developing weapon capabilities and . . . weapon-limiting capabilities."

tal, a vehicle-profiling system that can tell the system operators whether a given truck or rail car is large enough to contain a cargo that could be a banned missile, video cameras to watch the portal areas continuously, an x-ray system to reveal whether rail cars' contents could be part of a banned missile, and the computers and software that control all the devices and record data from the sensors.

If any of the sensors shows that a cargo exiting the Votkinsk plant matches the size, shape, and weight of a treaty-banned item, inspectors can exam-

(Continued on Next Page)

From Voltmeters to Modular Buildings

Tons and Tons of TOSI Hardware Shipped by C-5A

Sandia (with a number of contractors) has prepared technical on-site inspection hardware for shipment to the Votkinsk missile plant in three phases. The first two shipments, in August and November 1988, consisted of hardware for which Verification Technology Div. 5219 had primary responsibility, with support from other 5210 divisions and the rest of 5200.

Sandians worked with the two groups that will be stationed in Votkinsk to run the system. One is the OSIA (On-Site Inspection Agency), DoD's new field operating agency. It is responsible for implementing the INF Treaty's inspection provisions.

The other is Hughes Technical Services Corp., a subsidiary of Hughes Aircraft, Inc., of Long Beach, Calif. Under a contract with the Air Force's Electronic Systems Division, Hughes is providing civilian crews that will, under OSIA oversight, operate and maintain the TOSI equipment at Votkinsk.

"We familiarized the Hughes people with the TOSI equipment — how to install it, how to troubleshoot it, and how to maintain it," says Dave Gangel (5219), project leader for 5200's TOSI work. "And we worked with them to get all the procedures down on paper — and to get all the equipment packed for shipment to Votkinsk. It was a busy summer and fall!"

The August shipment included about

160,000 pounds of the continuous-monitoring equipment, which went to the Soviet Union aboard one of the US Air Force's huge C-5A "Galaxy" transports. The cargo included sensor hardware, structural hardware, cabling, special construction materials, and testing/diagnostic equipment.

The November shipment was even larger. Like the Phase I shipment, it went by C-5A. It included quickly deployable modular buildings for data centers, complete with a backup power system and the remaining sensors for weighing vehicles and determining their profiles.

"The people in 5200, in Drafting, and in Purchasing all worked hard to meet their deadlines," says Stan. "They deserve a lot of credit."

The final shipment, which Stan says will go to Votkinsk this spring (probably on a plane smaller than the C-5A), consists of an x-ray system called "Cargoscan™." It was developed by a contractor team from Bechtel National, Inc., and American Science and Engineering and modified to meet the specific requirements of the INF Treaty.

By producing an x-ray beam less than an inch wide and 13 feet high, this system will make it possible to "see" missile parts (such as the booster stage) inside a rail car without opening either the car or the missile's packing canister.

Sandians Serve on Soviet Site

Editor's Note: While local Sandians were preparing TOSI equipment in 1988 for shipment to the Soviet Union, two Sandians were among the (mostly Air Force) contingent preparing a place for the equipment in Votkinsk, site of an SS-25 missile-production plant. Ken Ystesund (5217) was in the USSR from July 1 to July 21, Frank Martin (5219) from July 1 to Aug. 9.

Some excerpts from the journal Frank kept during his stay:

7/1/88: We [the advance crew] will penetrate Soviet airspace at about 1230 Frankfurt time at a point nearly due east of Copenhagen. This will be the first unaccompanied penetration of Soviet airspace by a US military aircraft.

After dinner [in Moscow], we were flown to Izhevsk, the capital of the Udmurt Autonomous Soviet Socialist Republic . . . Equipment is still in the possession of the Soviets and we do not know now when it will arrive. We left the airport [on a bus headed for Votkinsk] at about 10 p.m., and dusk was only just approaching. The countryside is quite green, the odor of nitrogen fertilizers was quite evident. There are rolling hills similar to those in Northern Virginia. Some forests, mostly birch and fir trees.

I was worried before I left Albuquerque about some of our equipment which should be grounded or should at least pick up the earth ground as provided for by the plug which provides power. I needn't have worried. The Soviets do not use a ground, neither are the power receptacles polarized. You poke and take your chances.

We are allowed to leave our apartment building with the permission of the concierge and walk around within a designated area about 1 square mile in extent without an escort. To go outside of that area requires an escort. Notably, the restaurant where we will eat

(Continued from Preceding Page)

ine it more closely with approved portable monitoring equipment.

The system had to be designed to work during the Votkinsk winter — low temperatures there reached nearly -40°F this January.

'Sandia Labs East'

When US inspectors went to Votkinsk in July 1988, they took an interim shipment of equipment that Sandia had put together for them to use before the major hardware began arriving. This shipment included basic inspection equipment such as video cameras, recorders, and lights, says Stan.

Sandians Frank Martin (5219) and Ken Ystesund (5217) also went with the first wave of inspectors. In a journal Frank kept during that period (see selections from it in "Sandians Serve on Soviet Site"), he dubbed the inspection site "Sandia Labs East."

The name fits: According to Stan Fraley, many Sandians have been there since, one or two at a time, almost continuously. "Because most of the monitoring equipment was furnished through Sandia," says Stan, "it makes sense for us to be there until everyone is sure all the equipment is operational and the permanent crew has it fully in hand."

That will probably mean a Sandia presence at least through FY89 and possibly longer, says Stan.

"Clearly, Sandia will continue to play a role in supporting the INF treaty," Stan continues, "both at Votkinsk and through the Special Verification Commission, where we've supported official negotiations on equipment at Votkinsk and a number of other equipment-related issues.

"For instance, Pauline Bennett [9241] and Dave Gangel [5219] have been assisting in the evaluation of equipment that the Soviets have proposed — both what they want to install at Magna and what they have manufactured for our use at Votkinsk."

This spectrum of INF-related work displays a part — but only a part — of Sandia's well-rounded personality, says Stan. "As a lab, we engage both in

every day is outside of the area.

7/3/88: We had a training session today on the safety aspects of the operation of the gas stoves in our apartments. Our instructor burned her fingers twice trying to light the oven. Good object lesson.

We waited all day today for the arrival of our equipment, having been told that it would arrive about noon. It finally arrived about 1800, precisely time for dinner, at which you only get one chance. We chose dinner, but came back to the site to unpack

The latest in traffic control devices — a piece of cardboard labeled "STOP" in English and Russian.

all the equipment, including 2000 rolls of toilet paper and other assorted household and office supplies as well as the portal equipment. . . . Mr. Lopatin [a Soviet official assigned to the site] stated that we could not remove anything from the shipment until it had been inspected. When this inspection will take place, no one knows.

Birthday Cake for Votkinsk Kids

7/4/88: Happy birthday to me. . . . All the bunch [the US team] had a little birthday party for me, complete with cake that the Cosmos Cafe made for them. Sang happy birthday out in front [of the apartment building]. Lots of children (40 or more) out in playground watching. Gave them some cake and passed out American flags. Children are the same the world over, innocent and pleasant.

7/5/88: No inspection today either. . . . It now seems that there will be no inspection until a "Commission" arrives from Moscow to examine with a fine tooth comb all the equipment that was brought.

developing weapon capabilities and in developing weapon-limiting capabilities. And among the weapon-limiting capabilities, we work in a variety of verification technologies.

"The public should not get the impression that just because the Soviets will let us inspect on-site at Votkinsk, verification in general is now a given. Although on-site inspection is currently prominent, it is aimed only at verifying the other side's declared actions. So it can be only one part of our overall treaty verification program.

"Many other techniques are unilateral and involve our national technical means — satellites are

"Our broad knowledge of weapon systems, arms control, and verification technology . . . has provided Sandia with new opportunities to contribute to the arms control process."

a well-known example. These are essential if the US is to have confidence that treaties can be verified. So Sandia also has efforts that support other verification techniques. As a national lab, we owe it to our country to help make sure that the country can do what is in its best interest."

Roger Hagenruber echoes the theme of wide-ranging capabilities: "Our broad knowledge of weapon systems, arms control, and verification technology — and our care in dealing with the sensitive political and diplomatic environment — has provided Sandia with new opportunities to contribute to the arms control process.

"From across the Laboratories, contributions are and will be made to current and future negotiations. Our commitment to quality system engineering and to the strengthening of our national security — in all its forms — is the required Sandia investment in underwriting a major future role."

●CS/BHawkinson (3153)

This includes microwave ovens, PC's (I have mine that I handcarried), paper towels, and all of the equipment sent over.

7/6/88: Because of the equipment snafu, we have the latest in traffic control devices installed at the main gate — a hand lettered piece of cardboard 18 inches by 36 — labeled STOP in English and Russian.

7/8/88: They arrived! Examined toilet paper and [vacuum cleaners] all day. Tomorrow is ours!

7/9/88: On one lightning arrester, [the "Commission"] found that a screw was not fully tightened. This seemed to indicate to them that we may have opened it up and put something else inside.

7/10/88: There are many individual houses in Votkinsk as well as many apartment complexes such as the one in which we are housed. Most of the individual houses are log cabin type houses. Most do not have indoor plumbing. . . . The houses themselves are quite charming, and most are well kept. . . . Window treatment a very individual thing. Hand-worked outside window frames, some very intricate. Homes usually stained or naturally weathered, window surrounds painted most often white or blue.

Oil and Gas: 6 Rubles

7/12/88: Now have free access to our equipment. This is the first day that has been true. Organized storage building. Got gas/oil for generator. Cost 6 Rubles for 2 gal gas, 1 1/2 qts oil (about \$10). Set up video and tested all cameras. Put all instruments

(Continued on Page Eight)

Fraley Faces Soviets In Working Group

In September 1987, the US put a draft Inspection Protocol on the negotiating table at Geneva. The original draft was prepared by Stan Fraley (9242), though it was, says Stan, "re-written by committee" before the Soviets saw it.

"If the Soviets had followed their usual negotiating practice," says Stan, "we could have expected them to come back weeks or months later with a counter-draft completely different from ours.

"Instead, about a week later, they agreed to establish a joint working group to produce a joint draft. I was appointed to chair the US side.

"At the first meeting of the joint working group, the head of their side said that instead of countering with their own draft, they would work from the US draft. That's when I began feeling they were really serious."

But as work began on the Inspection Protocol, overall treaty negotiations were entering their final phase. The Soviets had apparently been reluctant to discuss inspection techniques until it was clear that the Geneva meetings would produce a treaty. So the joint working group had only a few months to produce a mutually acceptable document.

"Progress was steady — almost amazingly so," says Stan. "Still, we haggled over every word — there weren't any freebies. We met with the Soviets just about every working day. And by November, that meant virtually seven days a week."

On the negotiators' last day in Geneva, the final changes were put into the text, and the Inspection Protocol (in English and Russian) officially existed. Taking up eight pages of three-column type in English, it is a page longer than the body of the treaty itself. The chief negotiators for the US and the USSR initialed the Inspection Protocol (along with another treaty attachment) aboard a US Air Force plane on the way to Washington, D.C.

(Continued from Page Seven)

Soviet Site

needing battery charge . . . on charge.

7/13/88: Col Englund has just returned [from Moscow] and is the bearer of many Rubles. Good thing. I was down to Rubles 4.50. Breakfast costs 3.95. I won't have to wash dishes now, and can buy more gas for the generator.

7/15/88: I am almost certain now that Ken [Ystesund] will leave before we are able to do anything of significance [with] the video. C'est la vie. I will do it and it will work. We will set up another practice session for me today so that I can hook-up, adjust and tweak just like a real technician.

7/16/88: The main thing here that keeps you from having a little peace of mind is sheer boredom. As a naval aviator, I used to endure hours and hours of boredom punctuated by a few moments of stark terror. A little terror would help. Only thing close occurs occasionally at meal time in the Cosmos Cafe. . . . The food there is different, sometimes terrifying to contemplate, but tasty.

Traffic Lights Didn't Smoke

7/20/88: This is the day we really do something. At 1000, Lopatin came and said that we should place the traffic lights in their desired positions. He designated two of his minions to help. As soon as he left, they disappeared. Placed traffic lights. Rail inspector arrived later to say that at least two meters clearance needed from rail to nearest part of light. . . . Moved light 18 mm south. Later in day car exited facility, didn't stop. Soviet escort complained that reason was that traffic lights don't work. Of course they don't work, power installation won't be started until tomorrow. Back to the cardboard sign.

7/21/88: There was some progress today on the wiring for the traffic lights. Some big decisions had to be made on what cable to use. The Soviet standard seems to have changed with respect to earth

Terry Jordan (1555) was recently elected to a three-year term as director of Region 4 in the American Institute of Aeronautics and Astronautics (AIAA). Region 4 (with more than 2600 members) includes Texas, New Mexico, Oklahoma, and Arkansas. Terry directs the Regional Activities Committee and serves on the Institute's board of directors.

* * *

Douglas Adkins (6217) received a Best Paper Award for "Design Considerations for Heat-Pipe Solar Receivers" at the American Society of Mechanical Engineers' (ASME) International Solar Energy Conference April 2-5 in San Diego, Calif. His paper was part of a session on components of solar thermal systems.

* * *

The ASME monthly meeting is April 25 at the County Line Restaurant (9600 Tramway Blvd. NE). ASME Distinguished Lecturer Prof. Chang-Lin Tien (University of California, Irvine) will speak at 8 p.m. on recent developments in Chinese science and technology. The meeting includes a social hour at 6:30 p.m. and dinner (\$12.50/person) at 7:15. Contact Ed Austin (DMTS, 5161) on 6-7809 for reservations.

* * *

Mary Ann Lindsay (4000) was recently installed as president of the Duke City Business & Professional Women, an organization dedicated to the professional growth of working women.

* * *

Equal Employment Opportunity and Affirmative Action Dept. 3510 announces Sandia International Day May 12. Activities will be held on the Bldg. 891 mall and south of the Bldg. 861 Cafeteria from 11:30 a.m. to 1 p.m. Events include a native-costume parade, folk dances and music, and international food. Exhibits of ethnic arts and crafts and collections of cultural items are on display in the Bldg. 802 lobby and the Tech Library. All Sandians are encouraged to join the fun and help celebrate Sandia's diverse work force.

* * *

In Moscow, Washington, Geneva

Sandians Take Part in US-Soviet Technical Talks

Beginning shortly after the INF Treaty was signed in December 1987, Sandians were participating in pre-inspection technical talks with the Soviets.

"The treaty allowed 30 days between its effective date — June 1, 1988 — and the beginning of inspections," explains Stan Fraley (9242), Sandia's liaison with DoD's Office of Verification Policy during treaty negotiations. "Clearly, that wouldn't have been enough time to reach agreement on equipment.

"So we had a series of technical talks from December 1987 onward, letting us reach an understanding that would be formalized the next June."

Stan participated in the first of the talks, in Moscow. Both Stan and Don Bauder (DMTS, 9242) went to the second, held in Washington, D.C. (Don was project leader of the TOSI work until March 1988; now he's concentrating on

missile "tagging" techniques that could be used in a future strategic arms reduction treaty.) As an adjunct to the Washington session, a delegation of Soviets visited Sandia's TOSI facility and the Magna site in April '88. Finally, Don attended the third session, in Vienna.

Last June 1, the treaty brought a Special Verification Commission (SVC) into existence. This commission, intended as a mechanism for US-Soviet communication on the treaty, officially established the agreements reached during the informal technical talks. Again, Sandians had a part. Stan, Don, and Keith Marlow (9112) participated in the first round of SVC meetings.

At the second round (late summer 1988), Pauline Bennett (9241), John Holovka (9241), and Dave Gangel (5219) participated. Pauline and Dave also attended the latest SVC sessions, last December.

grounds. It seems that traffic lights have to have earth grounds. Never mind about the bathroom or the kitchen, but these American traffic lights may be dangerous.

7/22/88: ** Historic Event. At 1656 on 7/22/88, the Votkinsk Portal went high tech. Traffic lights were turned on for a smoke test. No smoke. They work.

7/27/88: ** Management note that the sun never sets on the "Sandia empire" while I am here. This fortuitous condition has only two more weeks to run. Sell stock fast.

7/28/88: Raining this morning. Naturally, today is day we can put up [video-camera] tower as con-

crete has now cured. Better get out boots, poncho, and rain hat. Wore same. Poncho olive drab, hat yellow. Soviet linguist told me I look like a big chicken.

Finished with tower, camera, and light check at 1900. Dinner, shower, and bed.

7/29/88: **** Four star event. At 1720 hours on 7/29/88, video on at Portal. Lopatin watching when turned on video. Lightning protector used would not pass signal. Removed and connected cable directly. Lopatin said "if that was really a lightning arrester, it would have worked." I will replace with another one later. Good picture, will make final adjustments next week. ●

Take Note

On April 21, at the Sheraton Old Town Hotel (Turquoise Rm. at 8 p.m.), Henry Rowen (Edward Rust Professor of Public Policy and Management at the Graduate School of Business and Senior Fellow at the Hoover Institute, Stanford University) will discuss the impact of recent events in the Soviet Union on America's future world role. The discussion is sponsored by the Stanford Club of New Mexico. Admission is \$6. Contact Bob Gough (9241) on 6-2539 (daytime) or Ramon Mondragon on 243-0577 (evening) for information.

* * *

Sandia's contract travel agency, Corporate Travel Consultants (CTC), invites Sandians to an open house

April 27, 5-7 p.m., 2300 Buena Vista SE (1 block south of Gibson, 1 block east of Yale), to meet agents, tour facilities, and pick up some business and vacation planning ideas. Representatives from airlines, car-rental agencies, and hotels will be present to answer questions. For information, contact Kathy Eyster (3743) on 6-9959.

* * *

Nuclear fusion as an energy source — though not the recent "cold fusion" controversy — is the subject of a documentary, "The Sun of Man," airing on KNME-TV April 26 at 10 p.m. and April 28 at 11 p.m. Interviewees include Isaac Asimov and Soviet physicist Andrei Sakharov.



PARTNERSHIP was theme of second annual Just-in-Time Vendor's Luncheon, acknowledging (says Nina Chapman, supervisor of Purchasing Div. 3745) that the JIT vendors have become partners with Sandia in providing service to Sandia organizations. Award for "Outstanding JIT Vendor for 1988" is being presented by Dick Russell (Director of Purchasing and Materials Management 3700) to Jeff Thompson and Shane Page of Albuquerque Valve & Fitting Company. Similar awards went to Fisher Scientific and Hale Sunland. Awardees were chosen for providing exceptional service in a wide variety of areas, including helping reduce prices through value analysis.

US Savings Bonds: A Sure Thing for Unsure Times

If you're thinking about the financial-security part of your future — and who isn't? — you're aware of some cold, hard facts:

The stock market is still a tad jittery, real estate isn't the sure thing it once was, and many stock dividend yields aren't increasing as they once did.

So what's an investor to do? Many professional investment strategists give the same advice: Diversify — don't put all your eggs in one basket; minimize risk — but keep that money growing.

Sounds easy enough, but what *are* some of the right choices?

One, many experts note, has several built-in

Diversify — don't put all your eggs in one basket . . .

advantages and is virtually risk-free: savings bonds. Yes, savings bonds — the place where patriotic (but not necessarily savvy) people parked their money 20 years ago.

But the image changed in 1982, when the bond program was overhauled to make it competitive with other investments. Some of the advantages (detailed below) include market-based interest rates, tax benefits, and ease of purchase — advantages you'll hear more about during the Labs' 1989 Savings Bond Drive, April 24-May 5.

"It's clear that many Sandians at all locations — Albuquerque, Livermore, Tonopah, Pantex — have included bonds in their financial planning," says Gary Mauth (9220), chairman of the 1989 Savings Bond Committee. "That's confirmed by our participation rate at the end of last year's campaign — between 96 and 97 percent — and a record investment allotment of more than \$2.9 million.

"Bonds are a good deal when you're looking at options for the long term," Gary continues. "They're safe, interest is federal-tax-deferred until they're cashed in, and there's no state or local tax on earned interest. And the payroll-deduction route makes them affordable and easy to buy."

Bonds pay a floating interest rate set every May and November at 85 percent of the average market rates on five-year Treasury securities during the preceding six months. The interest rate for the current period (ending April 30) is 7.35 percent; bonds held since interest became market-based in 1982 would pay 8.5 percent if they were redeemed during this period.

There's a 6 percent interest-rate floor on bonds held at least five years. At the end of five years, if a bond is cashed in, the holder gets the average of the



ON THE ONE HAND, there are US Savings Bonds; on the other, the possibility of being a sweepstakes winner. Susan Stinchcomb (3144), one of the directorate coordinators for the 1989 Bond Drive, is betting on the former for future financial security. "Bonds in the hand are better than sweepstakes offers in the bush," says Susan.

semiannual rates during the five-year period — 85 percent of the average T-note rate — or 6 percent, whichever is *greater*. A floor — but no ceiling — on their yields makes bonds a safe and sure investment.

Gary notes that stockpiling bonds for retirement or for children's college expenses is advantageous. "Once retired," he says, "people are generally in a lower tax bracket, so taxes on the interest — when

. . . there's a new advantage, starting in 1990, for some parents whose children are college-bound.

bonds are cashed in — should be lower for these folks."

Paying the high costs of college can be a much less painful experience if there's a cache of bonds saved over the years. And there's a new advantage, starting in 1990, for some parents whose children are college-bound (see "Parents . . . Take Heart").

Another plus for retirees — or anyone who's looking for current income from investments — is the ability to convert Series E or EE bonds to Series HH bonds, for which holders receive semiannual interest checks. (Series HH bonds are larger, with a minimum investment of \$500; they're bought at face value, and there's no conversion fee. Though interest on the rolled-over E or EE bonds continues to be deferred, the holder *does* pay tax on the semiannual HH interest.)

As in other years, the 1989 Savings Bond Drive

will be conducted by VP representatives with the help of directorate coordinators and canvassers. Employees will each receive a payroll deduction card to begin participating or to change basic allotments, beneficiaries' names, or denomination amounts.

"Of course, Bond Committee members encourage Sandians to continue their high rate of participation," says Gary. "And we also hope everybody will take a good close look at his or her *level* of support. Increasing that basic allotment makes good sense; you receive the bonds sooner, and they start earning interest sooner." ●PW

Allotments, Denominations

If you were enrolled in a payroll-savings plan before Feb. 1, 1988, bonds are available in eight denominations ranging from \$50 to \$10,000 (you pay half the bond's face value). For people enrolled after that time, the minimum denomination available for new enrollees is \$100 — at a cost of \$50.

(The US Treasury Department made this change last year to reduce administrative costs. *The \$50 and \$75 denominations still can be purchased by people who began buying those denominations through payroll deduction before February 1988.*)

Deductions may be as little as \$1 a week for weekly-paid employees and \$2 each paycheck for semimonthly-paid. They are banked for you until there's enough in your "account" to buy a bond at the denomination you've decided on. So, for people enrolling in the payroll-deduction plan for the first time, the difference is one of time; for example, if \$5 is allocated per paycheck, it will take longer to reach the \$50 total — and receive a \$100-face-value bond — than it would if lower-denomination bonds were available.

Those who participate in the Bond-a-Year Plan (one annual payment) — even if they're new to the program — may purchase the smaller denominations (or larger ones, if they're so inclined).



The 1990 Advantage

Parents of College-Bound Children: Take Heart

Beginning in January 1990, there's a brand-new advantage for many persons who buy US Savings Bonds to meet future college expenses.

Interest-tax on bonds purchased after that time can be avoided altogether if the bond proceeds (principal and interest) are used to pay college tuition and required course fees and expenses of the taxpayer, the taxpayer's spouse, or the taxpayer's dependent.

The exemption applies only to new Series EE bonds with an issue date after Dec. 31, 1989. And it begins phasing out for couples with adjusted gross incomes that exceed \$60,000 (though some tax advantage remains until a joint income of \$90,000 is reached). For single taxpayers, the phase-out begins with a \$40,000 income, though partial tax benefits remain until a \$55,000 income is reached. (After 1990, these income limits will be indexed for inflation and rounded to the nearest multiple of \$50.)

Some important terms and conditions apply:

- To be eligible for this tax advantage, bonds must be registered in the taxpayer's name alone or in the names of the taxpayer and taxpayer's spouse. *Bonds issued in the name of a dependent child will not be eligible;*
- If the registered owner of a bond is married, he or she must file a joint return for the year in which bonds are redeemed to make them eligible for the program;
- Only bonds issued to a person at least 24 years old before the date of issue will generate excludable interest; and
- Bonds bought as gifts (for example, by grandparents) are not eligible.

Your 1989 Bond Drive deductions begin in July (June 30 for semimonthly-paid employees, since July 1 is a Saturday). Translation: Half the bond allotments you specify during this year's drive could be free from interest taxation if the bonds are used for college expenses.



WORK EXPERIENCE TRAINEES (from left) Brenda Barajas (3533), Gena Bass (3437), and Genevieve Hernandez (1556) will soon head for Dallas to attend the national Business Professionals of America conference on April 27. They placed in the top three in statewide office skills competition (different categories) last month and will represent New Mexico in national competition at the Dallas conference. Sandia's 51 work experience trainees — all high school seniors — attend classes in the morning and work afternoons at the Labs, according to Soila Brewer (3533), program coordinator.

Take Note

A Sandia Clowns Comedy Hour is planned April 29, 2-3 p.m., at the Que Pasa Recreation Center. The clowns will perform skits and magic tricks and provide face painting. Admission is \$2/adult and \$1/child. The clowns will use the proceeds to purchase a sound system for the group to use when they perform for various area charity events. For information, contact Cindy Gregory (3420) on 4-8082.

* * *

Volunteers are being organized by Keep America Beautiful coordinator Madeline Dunn to clean up Albuquerque neighborhoods during the Second Annual Glad Bag-A-Thon™ April 29. Following the cleanup, volunteers will be treated to a celebration party at 1 p.m. at the Beach water park. All participants will be admitted free. Last year, 15 tons of litter were collected from Albuquerque and more than 14 million pounds of trash and recyclables from 47 cities. Bags, souvenir painter's caps, posters, banners, and educational brochures will be distributed and cash prizes awarded to participants. For information, interested groups and individuals can contact Madeline on 768-3550.

* * *

Tim Rumsey, UNM employee trainer and educator, is the final speaker in the lecture series sponsored by the UNM College of Nursing as part of UNM's Centennial celebration. He will speak on "Humor and Health" May 6 from 10 a.m. to noon at the Continuing Education Center (1634 University Blvd. NE). Admission is free.

NO, HE'S NOT A CAR SALESMAN — He's Herb Pitts (3100), welcoming Bob Woods (9231) to good ol' Number 16 — Herb's reserved parking space. Because Bob won a Labs-wide drawing during National Library Week, he won the right to use Number 16 for a month and was named "Library User of the Month" by Technical Library Dept. 3140.



Medical Corner

Lecture on Skin Cancer Coming Up — Free Screening Also Planned



What do farmers, sailors, and habitual sunbathers have in common? Lots of exposure to intense sunlight — and a high chance of developing skin cancer. Anyone, in fact, who spends much time in the sun (or in tanning booths) increases the risk of skin cancer.

Studies show that the incidence of skin cancer — the most frequent type of cancer in humans — has been on the increase for the last few decades. At the current rate, one out of 100 people will develop malignant melanoma by the year 2000. Other adverse effects of too much sunlight include depressed immunity and premature aging of the skin.

Dr. Wendall Robison, an Albuquerque specialist in skin-cancer diagnosis and treatment, will talk

to Sandians about the effects of sunlight on the skin and about skin-cancer diagnosis and treatment. He'll show slides to demonstrate how to identify skin cancers and will present strategies for preventing them. He'll also discuss some good news about treatment and the newer medications that can help reverse adverse effects of sunlight.

Dr. Robison's lecture, sponsored by Medical's Total Life Concept (TLC) program, is set for Tuesday, May 2, at 12 noon in the Technology Transfer Center.

He will also be at Sandia for free personal skin-cancer screenings on May 3 and May 10. You can sign up for an appointment after the May 2 lecture. If you can't make the lecture but want to sign up for a screening appointment, call Elizabeth Berkenbile (3330) on 4-8238.

Retirement Planning

Rosa Steele, Economic Consultants Certified Financial Planner, will present a seminar, "Creating Your Financial Future," May 3 at 5 p.m. at the Coronado Club, Zia Rm. Call Rosa on 883-7460 or 294-6655 if you plan to attend.

Answers and Scoring for 'How're Your Basic Skills?'

Taking a test that purports [purports] to test your skills in grammar [grammar], spelling, and punctuation [punctuation] can be exhilarating [exhilarating] or embarrassing [embarrassing] [,] depending on the outcome [outcome] and the circumstances. If, as in this case, your [you're] simply taking an unofficial test for a momentary diversion [diversion][,], a high score might give you a brief lift, [;] a low score [,] a moment of private embarrassment [embarrassment]. In either case [,] its [it's] not likely to have any real effect [effect] on your life — you'll neither be benefitted [benefited] or [nor] penalized by your performance [performance]. The storey [story] would be a lot [a lot — if the phrase is to be used at all] different[,] however, if this was [were] an official test and you were hoping to be hired into a secretarial [secre-

arial] position on the basis of your score. You'd probably suffer some tense moments until you were appraised [apprised] of your score [,] and a low score would certainly effect [affect] your life.

Count the number of errors you spotted correctly and subtract one point for each unnecessary punctuation mark you added to the paragraph.

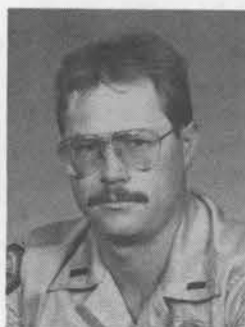
27 Correct: You've missed your calling — you should be teaching punctuation and grammar.

20 - 26 Correct: Consult your dictionary and grammar handbook more often.

13 - 19 Correct: Never send out a letter without sending it through a Sandia secretary first.

12 or Fewer Correct: Resist the urge to take tests like this.

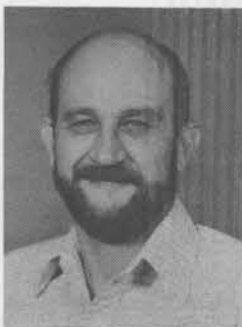
Deaths



Jim McQueary of Patrol Division-South 3435 died April 4. He was 29 years old.

Jim had been at the Labs since December 1983. He was a Security Lieutenant.

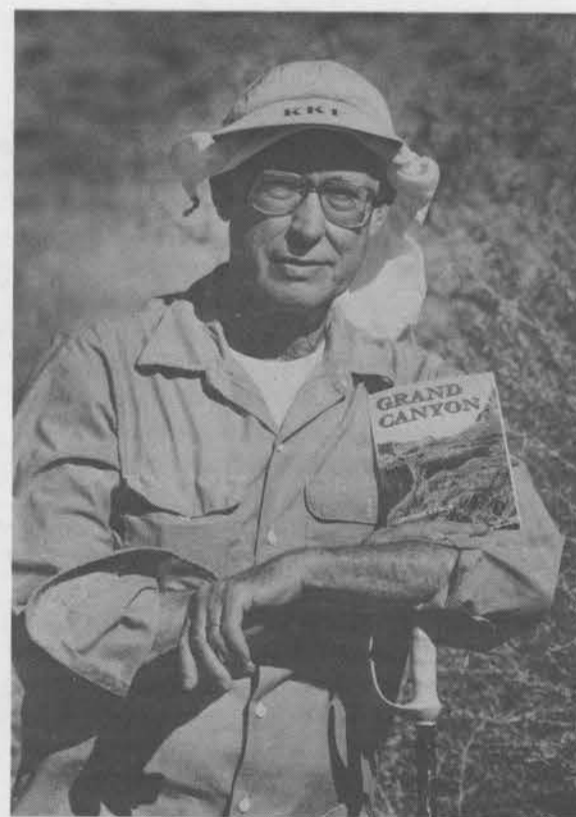
Survivors include his wife and two sons.



Paul Spencer of Electronic Development Division I 2341 died April 4. He was 51 years old.

Paul was a member of the technical staff. He joined the Labs in October 1956.

He is survived by his wife, three sons, and two daughters.



CUNNING RAVENS that unzip zippers on unattended backpacks and ring-tailed cats that brazenly burgle food stashes are just a few of the anecdotes enlivening the pages of George Steck's (ret.) new book, *Grand Canyon Loop Hikes I*, just published by Chockstone Press. The book describes four off-trail hikes that allow a common starting and ending point. George, a statistician who retired in 1980 after 25 years at Sandia, is a veteran Grand Canyon hiker and explorer. "I've spent the equivalent of a month in the Canyon every year for the last 20 years," he says. George's book is available locally at the Wilderness Centre, Sandia Mountain Outfitters, Cantwell's Books, and Book Fare — or, if it's sold out at these places, George can help you get a copy if you call him at 299-2313.

Deadline: Friday noon before week of publication unless changed by holiday. Mail to Div. 3162.

Ad Rules

1. Limit 20 words, including last name and home phone.
2. Include organization and full name with each ad submission.
3. Submit each ad in writing. No phone-ins.
4. Use 8 1/2 by 11-inch paper.
5. Use separate sheet for each ad category.
6. Type or print ads legibly; use only accepted abbreviations.
7. One ad per category per issue.
8. No more than two insertions of same "for sale" or "wanted" item.
9. No "For Rent" ads except for employees on temporary assignment.
10. No commercial ads.
11. For active and retired Sandians and DOE employees.
12. Housing listed for sale is available for occupancy without regard to race, creed, color, or national origin.

MISCELLANEOUS

CAMERA, Canon AE1-Prog., zoom lens, flash, camera bag, \$325 OBO. Grant, 296-5265 after 5.

TWO ACOUSTIC GUITARS, w/cases, \$60/ea. OBO. Schaub, 265-0004.

"ZELDA I," Nintendo game, \$25. Helgesen, 292-0770.

CAMERAS: Rollei twin-lens reflex, 80mm 2.8 Planar lens w/prism finder and pistol grip, \$400; Nikon N2020, AF body, \$225. Kramer, 294-0488.

WATER SKIS: O'Brien Master's slalom; Nash combo water skis, \$50/ea. OBO; miscellaneous life jackets, \$5/ea. Menako, 293-3068.

NEW TIRE, H-78-15 on 6-hole Chev. rim, \$35. Shunny, 265-1620.

CHEST FREEZER, Sears Kenmore, 12 cu. ft., almond, \$200. Bryant, 256-1110.

METAL SHED, 8' x 10', unassembled, no doors, free, you haul. Nickerson, 888-4159.

SOFA SLEEPER, colonial style, floral print, new, \$200; dinette set, contemporary, octagon shape, chrome legs, new, \$200. Sons, 294-6219.

COUCH, Stradford, \$100 OBO; glass-top, wrought-iron table, w/chairs, \$100 OBO. Lujan, 299-4820.

HENRI LEDUC OBOE, recently recorded and repadded, \$275. Stodl, 299-1828.

CHEST FREEZER, General Electric, 8 cu. ft., white. Flanigan, 299-0049.

TI9914A COMPUTER, w/30 cartridges, books, and case, \$200; computer desk, \$50; new custom drapes, lined, w/valance, federal blue, for sliding door. Castillo, 294-0624.

FORD ENGINE, 2000cc, w/all new internals and turbocharger, best offer over \$750. Bailey, 898-8055 after 6.

HAND-OPERATED COLLATOR, col-lates 8 stacks (8-1/2" x 11" paper), needs minor repair, free. Stamm, 255-2640.

KING-SIZE BED, w/bookcase headboard, mattress, box spring, linens, \$150; hide-a-bed, light tweed, \$75. Puhara, 255-7447.

GRAVITY TRACTION/INVERSION UNIT, \$225; McIntosh 240 power amplifier, \$500. Brower, 298-2254 after 7.

TIRES AND WHEELS for Ford 1/2-ton pickup: 2 wheels, \$30; 2 wheels w/tires (P23575R15), \$50. Baney, 294-8970.

IBM PS/2 MOUSE, \$50; Diablo/Wang LQ printer, \$200; printer floor stand, \$60. Ginn, 883-0004.

YARD SALE, multi-family benefit bazaar, April 22, 9 a.m.-2 p.m., 6012 Hannett NE. Martinez, 822-9802.

BUILT-IN STOVE TOP and oven, brown, 4 years old, make offer. Waddoups, 865-7952.

NU-WA CAMPER, sleeps 6, self-contained, 20', sway bars and equalizer hitch, \$3500. DeHerrera, 892-3535.

THREE HELEN HARDIN PRINTS, "The Woman's Series," #9 of 65 sets, museum-framed, best offer over \$12,000. Baca, 298-7748.

OSCILLOSCOPE, vector monitor; color bar convergence generator; Mannesmann Tally MT-180L full graphics printer; Xerox 820-II PC. Gough, 822-0090.

FENDER TWIN AMP HEAD, w/4' x 4' x 12" speaker cabinet, \$350. Jenkins, 344-3212.

SEARS CARTOP LUGGAGE CARRIER, 15 cu. ft., \$75. Sorenson, 298-1593.

CARPET KIT for long-bed Toyota, \$200; light bar, \$40. Padilla, 298-0903.

SAILBOARD EQUIPMENT: North Sp. Spyder 5.9 RAF, \$100; Aitken 96-5, \$210 OBO; boom, \$40, custom board, \$150. Healer, 298-6967.

TRU-SPOKE RIMS AND TIRES, 14", \$500. Padilla, 296-5048.

CONTEMPORARY DINING-ROOM SET, walnut finish, table w/leaf, 4 cane-backed chairs, gold upholstery. Fortune, 877-1465.

TEMPERED GLASS, 20 panes, 4' x 8' each, free; miscellaneous redwood (old decking), free. Brabson, 299-8114.

OAK CRIB, w/mattress, \$150; stroller w/canopy, \$40; child safety gate, \$5. Skinner, 281-9851.

WOODEN SCREEN DOOR, 30" x 80" x 1-1/8", w/nylon screen, complete w/hinges and knob, \$20; Mustang clutch disc/plate, \$25. Brion, 298-1761.

TOY FOX-TERRIER PUPPIES, 9 weeks old, black-and-white males. Miller, 299-6067.

SPEED QUEEN WASHER, heavy-duty, \$300 OBO; portable dishwasher, \$50 OBO; king-size water bed, w/drawers, storage, bookshelves, mirror, \$300 OBO. Silva, 836-7259.

FOUR WHITE RUBBER SOFTBALL BASES, \$20; 2 football blocking dummies and 4 blocking shields, \$125. Baca, 296-8474.

TWO ROUND-TRIP TICKETS to Las Vegas, leave May 26, return May 30, \$160/both. Davis, 294-0139.

CARVED TEAKWOOD CHESTS AND TABLE (SE Asia), carved leather-topped table (Venezuela), antique Jenny Lind bed, furniture, dishes, clothing. Alexander, 884-4930.

LOGITECH C7 MOUSE, including software and user's manual, \$49. Luther, 293-4462.

QUEEN-SIZE MAPLE BED, w/box spring and mattress, sell or trade for a hide-a-bed. Hill, 836-2752.

SPOILER, fits Pontiac Fiero, new, price negotiable. Reif, 299-2665.

QUEEN-SIZE BRASS BED, \$125; short-wide pickup camper shell, \$175; bookcase, \$8; Chev. 4x4 transmission and transfer case, \$200. Powell, 877-4939.

LOOM, table model, 4-harness, 26", w/table and accessories, \$135. Strance, 298-0258.

ONE-WAY TICKET, Albuquerque/Phoenix (either direction), good until May 15, \$29. Greenwood, 298-5268.

KENMORE COMPACT REFRIGERATOR, 1.7 cu. ft., \$45; 2 bookcases, \$25/ea.; 4-drawer letter-size file cabinet, black, \$60. Esterly, 296-9759.

AGV MOTORCYCLE HELMET, Kevlar and fiberglass construction, red/white, size S-7 (56), \$150. Kovacic, 256-9867.

SYLVANIA COLOR TV, 25", remote, 3-1/2 years old, \$225; Sharp VHS VCR, remote, HQ circuitry, 1 year old, \$150; King trombone, w/F key, \$200. Eley, 255-2617.

WHITE PEDESTAL TABLE, 42" round, w/4 swivel chairs, \$200. Surma, 293-2420.

SOFA AND MATCHING CHAIR, Early American, oak arms, patchwork velveteen, Scotch-guarded, \$200 OBO. Rieden, 281-9491.

BASKETBALL GOAL, child's backpack, 24' ready-made wrought-iron railing, stair rail, chain-link fabric, gate, blue drapes. Guidotti, 298-8818.

SLIDE-IN CAMPER, 11', \$1495; chain hoist, 1-1/2-ton, used 3 times, \$150. Dorsch, 884-1405.

KITCHEN SINK, Kohler, 22" x 33", 2 basins, almond color, enamel on cast-iron, \$50. Ricco, 828-1997.

COLT CAR-15 AZ, tritium night sights, extra mags, more, \$1600 negotiable. Johnson, 898-8439.

CHEV. IN-LINE 6-CYL. ENGINE, no carburetor, \$100 OBO. Zirzow, 294-7296.

TENT CAMPER, '71 Apache Mesa, hard-side w/canvas, sleeps 6, stove, heater, icebox, sink, electrical system, water, \$875. Benson, 296-4282.

GARAGE SALE, 20 families, children's items included, April 29 & 30, 8 a.m.-4 p.m., 13109 Buffalo Dancer NE

(SE of Tramway/Menaul). Hendrick, 296-2163.

BIRD CAGE, 2' x 4' x 6' tall, \$25; 2 lawn mowers, not working, \$10/ea. Shelmidine, 294-6264 after 6.

SUPER-SINGLE WATER BED, complete, 6-drawer pedestal, \$100. Smith, 293-0216.

COUCH, \$60; chair, \$40; Oster kitchen center, \$75; electric lawn mower, \$35; ladder, garden tools, misc. furniture. Gaither, 298-1043.

COMPACT DISC PLAYER, Yamaha CDX-510U, single-disc system w/direct-access remote, \$250 firm. Beader, 821-9160.

MAPLE BEDROOM SET: chest, dresser, queen-size headboard and footboard; DP exercise bike; cinder blocks. Frumkin, 255-3429.

RCA COLOR TV, \$200 OBO; 2-family garage sale: April 22, 12317 Prospect NE, call for time, clothing, toys, housewares, furniture, 3 refrigerators. TenClay, 294-4942.

HAMMOND ORGAN, full console, solid walnut, w/bench and Rhythm-Master, cost \$4500, sell for \$1995 OBO. Hoffheins, 293-5221.

DOUBLE SINK; rollaway bed; clothes line, reels in cylinder; 36" storm door; 4-lug rims; tires. Long, 294-4591.

CAMPER SHELL, insulated, LWB, \$150; Toyota long-bed custom topper, w/carpet kit, \$600; kerosene heater, 11,000-Btu, \$65. Marquez, 891-2964 or 831-3088.

TELESCOPE, Coulter Optical Odyssey-1, Newtonian reflector, 13.1"-diam. mirror, F4.5, Dobsonian mount, 2 eyepieces, 8x50 finder, light filter, \$300. Caskey, 296-6372.

OLDS. DIESEL PARTS: fuel-injection pump w/connections, \$175; starter, \$35; more. Norwood, 266-2717.

BABY ITEMS: playpen, car seat, infant seat, swing, toys, girl's clothes, etc. Kravnik, 294-1043.

AMIGO MOTORIZED WHEELCHAIR, \$500; other wheelchairs, \$150/ea.; crutches, \$40/ea.; bedside commode, \$50; automobile hand controls, \$200; tub handhold, \$10. Meissner, 268-7952.

FULL-SIZE BED, w/box spring, \$50; dog travel-kennel, \$25. Montano, 891-0921.

WALNUT DESK, Early American style, 7 drawers, 20" deep, 54" long, \$85. Schubeck, 821-3133.

TRANSPORTATION

'87 TREK PRO SERIES BICYCLE, Shimano 600 group, 23" Reynolds 531 frame, ridden 100 miles, \$350 OBO. Hughes, 823-1208.

'65 MUSTANG 2+2 fastback, 289 V-8, AT, PS, PB, AC, \$6000. Underhill, 881-0246 or 293-3660.

DUNE BUGGY, Pinto engine, sand tires, street-legal, extras, \$2600. Castillo, 294-0624.

'68 OLDS. CUTLASS, mag wheels, 100K miles, 350 engine, \$400. Denish, 256-1559.

'81 JEEP RENEGADE CJ-5, 6-cyl., 4-spd., 4-WD, 47.5K miles, new tires, \$4200 OBO. Lovato, 345-3268.

'88 HONDA PRELUDE Si-4WS, yellow, loaded, 10.3K miles, \$17,000 OBO. Morris, 828-0312.

'87 FORD ESCORT PONY, red, 10.5K miles, \$4950. Baca, 296-8474.

'77 VW RABBIT, 4-spd., 89K miles, original owner, blue, 2-dr., \$1175. Breeding, 260-0820.

FIBERGLASS FISHING BOAT, 16', w/40-hp Evinrude motor, trailer, accessories, \$3000. McKinney, 298-9114.

'74 TOYOTA COROLLA, wrinkled fender, \$300 OBO. Waddoups, 865-7952.

12' ALUMINUM BOAT, w/built-in flotation, \$400; '87 Honda Accord LXI, 4-dr., automatic door locks, AT, AC, PS, PB, sunroof, cruise. DeHerrera, 892-3535.

'87 NISSAN STANZA GXE, loaded, PW, PL, AC, AM/FM cassette quad stereo, security package, \$9989. Laney, 299-2903.

'82 DATSUN 210, 2-dr., 5-spd., AM/FM cassette, white, \$1400 OBO. Ford, 266-7351.

'87 BMW 325i CONVERTIBLE, red, tan top and interior, loaded. Wilkins, 831-4856 leave message.

'81 SUBARU SW, red, 4-WD, AC, manual, new radial tires, \$1800. Arenholz, 298-1724.

REPO: '86 Pontiac Firebird Trans Am,

8-cyl., AT, T-top, AC, cruise, bids accepted through April 30, we reserve the right to refuse all bids, subject to prior sale. Sandia Lab FCU, 293-0500, Sandy.

'79 OLDS. CUSTOM CRUISER, 86K miles, diesel, \$1050. Roberts, 881-2815.

'77 OLDS. CUTLASS BROUGHAM, 2-dr., PS, PB, AM/FM, automatic door locks, cruise, 75K miles, one owner. Foster, 268-1260 after 5:30 or weekend.

'87 IROC Z-28, loaded, black, Wolf bra and car cover, \$25K miles, \$15,800. Everett, 296-0920.

'81 MERCURY CAPRI, 93K miles, AM/FM cassette, moon roof, 4-spd., 6-cyl., \$3000. Austin, 831-2511 leave message.

'81 YAMAHA SR500, kick start, street bike, star silver. Rasmussen, 836-5513.

TRI-HULL TWO-MOTOR FISHING BOAT, extras, \$1950. Foley, 299-7733.

'76 IMP AZTEC BOAT, 21', 235-hp I/O, deep-V hull, tandem trailer, depth finder, extras. George, 296-0115.

'85-1/2 FORD ESCORT, red, PS, PB, 5-spd., AC, cruise, 78K miles, \$2700. Swanson, 281-2735.

GIRL' SCHWINN BICYCLE, 20", pink Stingray, w/banana seat. Wagner, 823-9323.

'72 DODGE POLARIS, 4-dr., hardtop, 77.8K miles, vinyl top, one owner, rebuilt carburetor, 360 cu. in., \$625. Robb, 821-2999.

'83 TOYOTA LAND CRUISER SW, AM/FM, AC, trailer hitch, passed city emission test, \$6500. Hass, 299-3506.

'54 FORD F-100 PICKUP, make offer over \$1500; '89 Chev. Beretta GT, metallic maroon, maroon interior, costs \$14,450 retail, take over \$257 payments. Bailey, 898-8055.

NAVARA 15-SPD. BICYCLE, cost \$300, sell for \$175. Atencio, 821-5295.

'79 DATSUN 280ZX, 5-spd., AC, cruise, AM/FM cassette, PW, louvers, 60K miles, \$3950. Kolb, 281-1570.

CENTURION LeMANS 10-SPD. BICYCLE, 21", all alloy accessories, Araya 27" x 1-1/4" rims, specialized tires, \$125. Joseph, 299-6989.

'73 VW BUG, 13K miles on rebuilt engine, dual-port engine, \$1695 OBO. Thorne, 884-4870.

'83 KAWASAKI KZ550A4, 4K miles, windshield, luggage rack and case, \$1200. Fraley, 296-6795.

'86 MUSTANG GT CONVERTIBLE, white exterior, red interior, 50K miles, new Gatorbacks. Bates, 898-0626.

BMX BIKE, Rodger DeCoster. Mayer, 294-3368.

'37 JOHN DEERE TRACTOR, Model B series, w/some attachments, \$1500 OBO; '83 Blazer S-10, 4x4, Tahoe package, \$4950 OBO. Sanchez, 255-5515.

'81 AUDI, 2-dr. coupe, AM/FM cassette, 5-spd., new engine, radiator, and clutch, 75K miles, \$2500 OBO. Van Geet, 281-4131.

TWO GIRL'S BICYCLES, Huff, 20" wheels, pink and white, w/baskets, \$60/ea. Doughty, 296-4142.

'80 YAMAHA 650 MAXIM, black, 650cc, 4-cyl., shaft drive, plexi-fairing, trunk, 25K miles, \$750. Weirick, 281-1462.

'74 SPORTSTER, chromed, 4-1/2 Quick-bob, new motor, balanced, ported, dual-plugged, hard saddlebags, king/queen seat, \$3200. Gonzales, 344-4933.

'85 VW VANAGON CAMPER, vehicle emissions certificate, all service records available. McHarney, 266-3639.

'85 PORSCHE 944, 11K miles, leather seats, power removable sunroof, cruise, burglar alarm, AC, extras, \$15,500. Lagasse, 293-0385.

MAN'S 12-SPD. BICYCLE, Centurion LeMans, 21" frame, \$150 OBO. McCormack, 296-3936.

'81 HONDA 750 INTERCEPTOR; '49 Ford 2-dr. coupe, V-8; '50 GMC pickup, call for prices and information. Pryor, 294-6980.

REAL ESTATE

3-BDR. HOME, UNM area, LR, DR, den, 1550 sq. ft., completely remodeled, refrigerated AC, forced-air heating, landscaped. Schaub, 265-0004.

3-BDR. MOBILE HOME, house-type construction (not a trailer), 2 baths,

country kitchen, 1620 sq. ft., Four Hills Mobile Home Park. Tennant, 275-9532 or 291-8335 after 7.

3-BDR. HOME, 1 bath, den w/rock FP, oak parquet floor, SE, \$63,000. Mareda, 296-0135.

MOSSMAN HOME, recently carpeted, new roof, 2561 sq. ft., \$119,800. Beller, 881-4047.

3-BDR. MOBILE HOME, '84, 2 baths. Reed, 821-6315.

3-BDR. HOME, 1410 sq. ft., 2 baths, 2-car garage, La Cueva High School area, 8233 Colfax NE, \$87,500. Antonelli, 821-3905.

3-BDR. HOME, 1-3/4 baths, near Ba-taan Park, hospitals, UNM, 720 Amherst NE. Perea, 821-9182.

3-BDR. HOUSE, 1500 sq. ft., 1-3/4 baths, double garage, FP, 10% assumable, open house Sat./Sun. or appointment, 3909 Erbbe NE. Chiu, 294-4634.

3-BDR. TOWNHOUSE, Four Hills area, 1-3/4 baths, plush carpeting, ceramic-tile entry, country kitchen, new stucco, landscaped, \$59,900. Burstein, 821-6688 or 275-3370.

3-BDR. HOUSE, family room, FP, study, Academy area, assumable VA, open house April 23, \$86,000. Assink, 345-2957.

3-BDR. VACATION HOME, in Chama, 4-car garage, fencing, extras, \$48,000. Atencio, 821-5295.

3-BDR. HOME, 1-3/4 baths, 16' x 24' workshop, pitched roof, garage, fully landscaped, near park, \$71,900. Henfling, 298-0596.

3-BDR. HOUSE, 1 bath, 1-car garage, pitched roof, 10-1/2% assumable FHA, \$64,900. Zirzow, 294-7296.

3-BDR. MOUNTAIN HOME, brick, recreation room, 2 FPs, enclosed garage, well, 1 acre, landscaping, La Cueva (Jemez Mountains), \$99,500. Bassett, 1-829-3944 weekend or 898-1840 weekdays.

20-85 ACRES OF LAND in northern New Mexico, San Juan Mountains, crossed by Rio de los Piños River. Reynolds, 1-864-6224.

20 ACRES, trees, meadows, \$105,000. McCormack, 296-3936.

WANTED

TROPHIES, wanted for church league tournaments. Nickerson, 888-4159.

IBM COMPUTER, AT-compatible. Kissel, 281-2729.

'77 DODGE MOTOR-HOME CHASSIS MANUAL, for Class C chassis, 440-1 engine. Bailey, 898-8055.

WOOD-BURNING STOVE, side-loader, will pay \$200 maximum. Frames, 344-6451.

YARD BOY to mow small lawn for \$10 every week, must provide own lawn mower and edge trimmer, Academy and Eubank area. Patterson, 822-1196.

CAR DOLLY for towing FWD car. Horton, 883-7504.

EXPERT ON COMPUSERVE INFORMATION SERVICE, to tutor or provide advice on usage; like to join or form local CIS users group? Sparks, 821-8442.

ROOMMATE to share 2-bdr. house in SE Heights, near Truman gate, \$175/mo. + 1/2 utilities. Eley, 255-2617.

LARGE DOG HOUSE. Surma, 293-2420.

CARPENTER to do some cabinet work, prefer retiree. Mayer, 294-3368.

ULTRALIGHT AIRCRAFT, 3-axis control. Bryant, 299-1292.

TWO MOUNTAIN BIKES, appearance not important, but must be in good condition. Danclovic, 255-4628 evenings.

HOUSEMATES, nonsmokers, share 3-bdr. home in Ladera area, carpooling available, immediate occupancy. Howard, 839-9203.

ROOMMATE, female, nonsmoker, to share 2-bdr., 2-bath apartment in NE, pool, etc. at apartment complex. Baca, 881-3079.

'81-'83 TOYOTA/DATSUN or equivalent car, less than 65K miles, one owner. Wawersik, 884-7690.

TO BORROW: videotape of PBS's "Long Ago and Far Away" series, first 7 shows. Wagner, 823-9323.

LOST AND FOUND

STERLING SILVER COYOTE PIN, lost, 3" x 1-1/2". Bland, 265-6286.

Psst! Attention, All Kids: Pounce on the Prizes Sunday

KIDS CAN WIN BIG at their very own bingo get-together this Sunday (April 23). Prizes include hula hoops, stuffed animals, games, and all kinds of other goodies (no cash giveaways, though). There's a low-cost buffet served from noon to 1 p.m., when the bingo action starts. Each player receives four cards each for just \$2.50, and there's no age limit.

TONIGHT, THE DOWN-SOUTH STAGE-COACH carries those inimitable Isleta Poor Boys right to the C-Club's front door. They'll provide the sagebrush-shuffle music (8 p.m.-midnight), after everyone fills up on Friday-night-dinner fare. Menu choices are crab legs (\$10.95) or filet mignon (\$9.95); help out the ranch hands in the kitchen with a reservation call (265-6791).

HEADING FOR THE TABLES one more time this month are the T-Bird card sharks. Fun and games start at 10 a.m. next Thursday, April 27. OK, daring-and-dynamic-dealer Jim McCutcheon — which will it be? A maypole costume, or something that's appropriate for Cinco de Mayo?

THE TWO-FOR-ONE SPECIAL DINNER next Friday night (April 28) offers two very elegant entree

enticements — prime rib or coquilles St. Jacques Mornay (the latter, translated for non-Francophiles: scallops in cheese-flavored cream sauce). Dinner for two costs just \$19.95 — a real bargain, when you throw in the membership discount. Afterward, Spinning Wheel plays variety music for dancing from 8 p.m. to midnight. Dinner reservations requested.

SUMMER'S NOT FAR OFF — and that means tennis and swimming season is right around the corner. Season passes are now on sale for both. (Only Club members may buy passes.) Prices are \$20/individual, \$40/couple, \$55/family of three, and \$5/each additional dependent family member.

GETTING IN THE SWIM for a new season is what it's all about when Coronado Aquatic Club (CAC) members and prospective members get together on Saturday, May 6, from 9 a.m. to noon at the Club. Register the kids (18 years old and younger) and get info on plans for this summer; registration fee is \$30. Only prerequisites for CAC membership are the ability to swim the length of the pool (25 yards) unaided, Club membership (for parents), and a pool/patio pass. More information from Deedra Lucero (299-7359) or Pat Pucket (298-6067).

Fun & Games

Bowling — Winners of the Scotch Doubles Tournament at Holiday Bowl April 8-9 were Terry Martinez (1270) and Ray Letourneau (ret.), with a 1246 combined handicap series. Second went to Ruby (6400) and Gary (9115) Cochrell, with a 1224 combined handicap series.

March Bowlers-of-the-Month include: Scratch — Lon Bivens (2314), 633; and Thelma Harrell (9119), 597. Handicap — Paul Sands (2612), 612 and 696; and Dee Ann Frew, 576 and 690.

* * *

Fun Walk — The National Cystic Fibrosis Foundation presents the "Great Strides" 10K (6.2 miles) fun walk to raise research money (\$45,500 goal for the Albuquerque area) Sunday, May 21, beginning at the Renaissance Center (directly north of Montano, west of I-25). Teams are forming at companies, schools, clubs, health spas, neighborhoods, and

wherever else friends get together. Included are music, team challenges, and other activities. For information, call Barbara David on 255-7507.

* * *

Soccer — Registration is now open for coed Sandia Summer Soccer. All Sandians, contractors, and adult dependents are eligible to join. Teams are organized according to skill level: beginners in the B division, all others in the A division. Games will be played at the Van Buren Middle School field (just outside Gibson gate) after work on weekdays. The season runs from June 5 through Aug. 25. The league needs team captains and referees. To play, you must fill out a registration form and return it to Stan Ford (SERP). Forms and information are available from Bill Wampler (1112) on 4-4114 or Ken Osburn (2821) on 6-2069.

In Wine, Truth?



At a summer school in Poland, a young Russian physicist, who was very much impressed by [mathematician Mark] Kac, gave him a bottle of wine wrapped in a copy of the newspaper *Pravda*. When Kac thanked him for his gift with the words "In vino veritas," the Russian answered immediately "No, the opposite," referring to the fact that "pravda" means "truth." Kac never got tired of telling this story.

Physics Today

Two Sandians Named "Women on the Move"

Gloria Chavez Millard (3202) and Patricia Salisbury (3510) were among 14 award winners honored at the YWCA's "Women on the Move" Awards Dinner on April 13.

The "Women on the Move" program honors Albuquerque-area women who have made significant contributions to their companies, organizations, and/or community, and acknowledges businesses and organizations that provide achievement opportunities for women.

Gloria, a member of the technical staff in the Environmental Protection Division, won in the Science/Engineering/High Technology category. Patricia, who chairs the Black Outreach Committee in the Equal Employment Opportunity and Affirmative Action Department, won in the Business (Non-Managerial) category.

Twenty-four Sandians were nominated for the awards; others include Patricia Appel (7413), Wanda Bechdel (1800), Soila Brewer (3533), Margaret Carroll (3215), Margaret Chavez (5248), Brenda De-Laurentis (154-1), Donna Eaton (2825), Marcella Florez (9110), Elaine Gorham-Bergeron (6413), Gwen Gorman (3322), Belinda Holley (3522), Karla Kern (3741), Margaret Olson (2814), Phyllis Pei (3202), Ann Riley (3714), Arlene Schaefer (1500A), Sandra Spraggins (9212), Sharon Trauth (7254), Linda Vigil-Lopez (7212), Marilyn Warrant (6323), Louise Weston (7223), and Margie Whipple (7844).

Sandia nominees will receive further recognition at a luncheon next month with Small Staff.

The Labs is one of 20 local businesses that received certificates of recognition at the Awards Dinner for efforts to help employees meet child-care needs.

Congratulations

To Jan and Steve (7243) Thornberg, a daughter, Julianna Beth, Feb. 28.

To Pamela and Robert (2542) Palmquist, a daughter, Alyssa Louise, March 26.

To Theresa and Wayne (7844) Willess, a son, Jered Parker, March 27.

To Lauren (1846) and Mark Gleason, a daughter, Jordan Elise, April 3.

To Dee Dee and Joel (9211) Blend, a daughter, Jamie Renee, April 9.

February Earnings Factors

Earnings Factors

Savings Plan for Salaried Employees (SPSE)

AT&T Shares	.9605
Government Obligations	1.0040
Equity Portfolio	.9754
Guaranteed Interest Fund	1.0067
South Africa Restricted Fund	.9749
Diversified Telephone Portfolio	
Unrealized Appreciation	.9741
Realized Appreciation	.0000*

Savings and Security Plan — Non-Salaried Employees (SSP)

AT&T Shares	.9601
Guaranteed Interest Fund	1.0067
South Africa Restricted Fund	.9753
Diversified Telephone Portfolio	
Unrealized Appreciation	.9748
Realized Appreciation	.0001*

*The 1 has been removed from the earnings factor. Current month's DTP earnings may be calculated directly: Earnings Factor x DTP Current Worth = Current Month's Earnings.



SPRINKLER-DODGING SEASON is here. Jeff Kawola (1811) makes sure he keeps his distance as he walks the cinder track around KAFB's Hardin Field (parade ground).